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(54) **MODIFIABLE KNOWLEDGE BASE IN A MOBILE DEVICE**

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(58) **Field of Classification Search** 706/51; 707/1, 3

See application file for complete search history.

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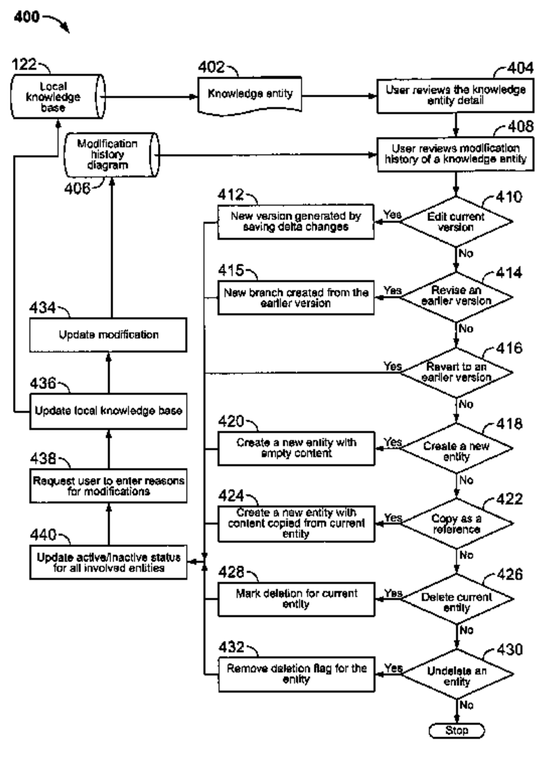
(57) **ABSTRACT**

One implementation provides a method for modifying a knowledge base on a client device. The method includes receiving input from a user of the client device specifying a first proposed modification to the knowledge base, modifying the knowledge base as specified by the first proposed modification, and subsequently receiving electronic information from a host server specifying a second proposed modification to the knowledge base. The method further includes comparing the second proposed modification to the first proposed modification previously made to the knowledge base and, upon comparison, determining whether to modify the knowledge base as specified by the second proposed modification.

14 Claims, 5 Drawing Sheets



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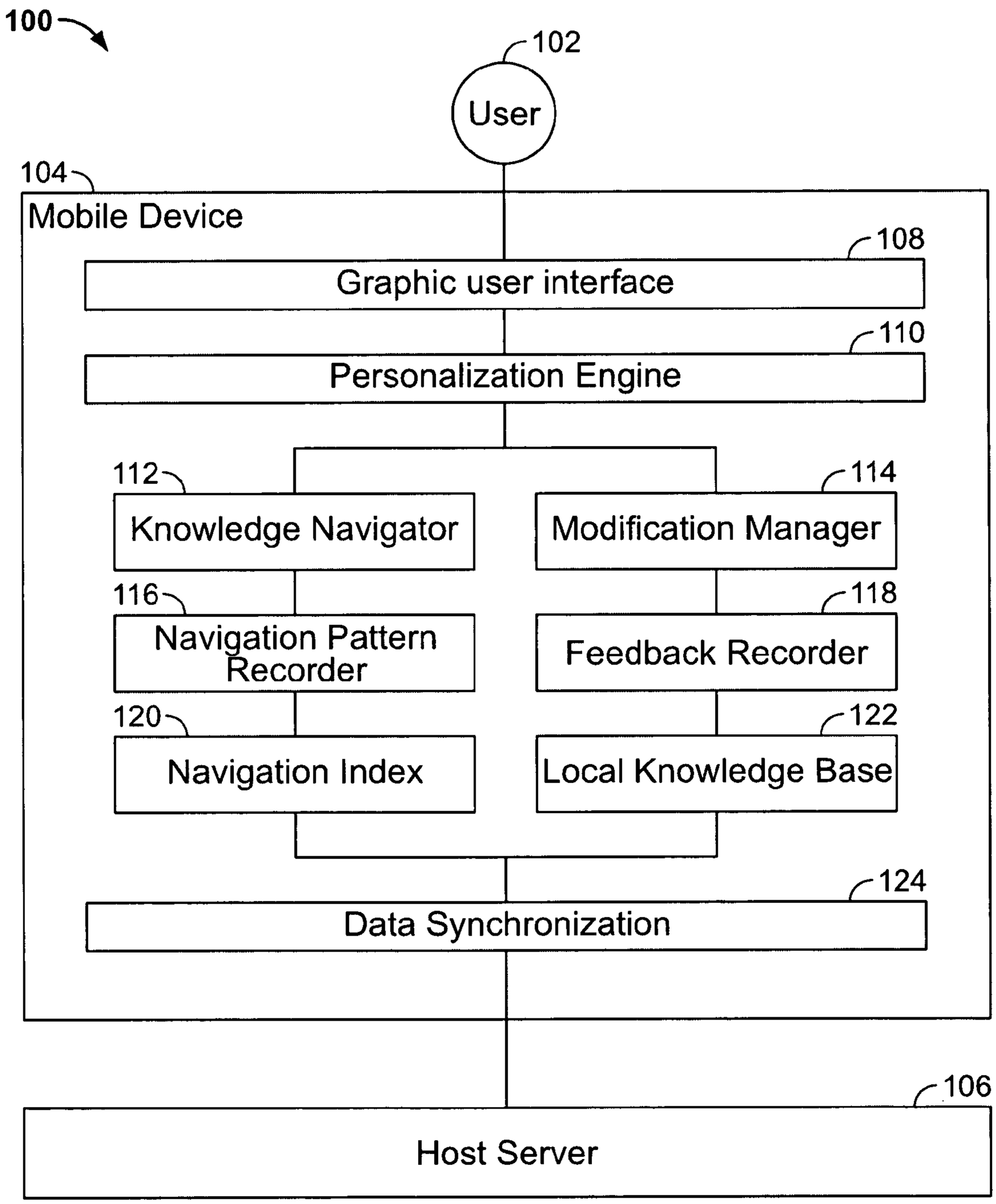
100
102
User
104
Mobile Device
108
Graphic user interface
110
Personalization Engine
112
Knowledge Navigator
114
Modification Manager
116
Navigation Pattern Recorder
118
Feedback Recorder
120
Navigation Index
122
Local Knowledge Base
124
Data Synchronization
106
Host Server

FIG. 1

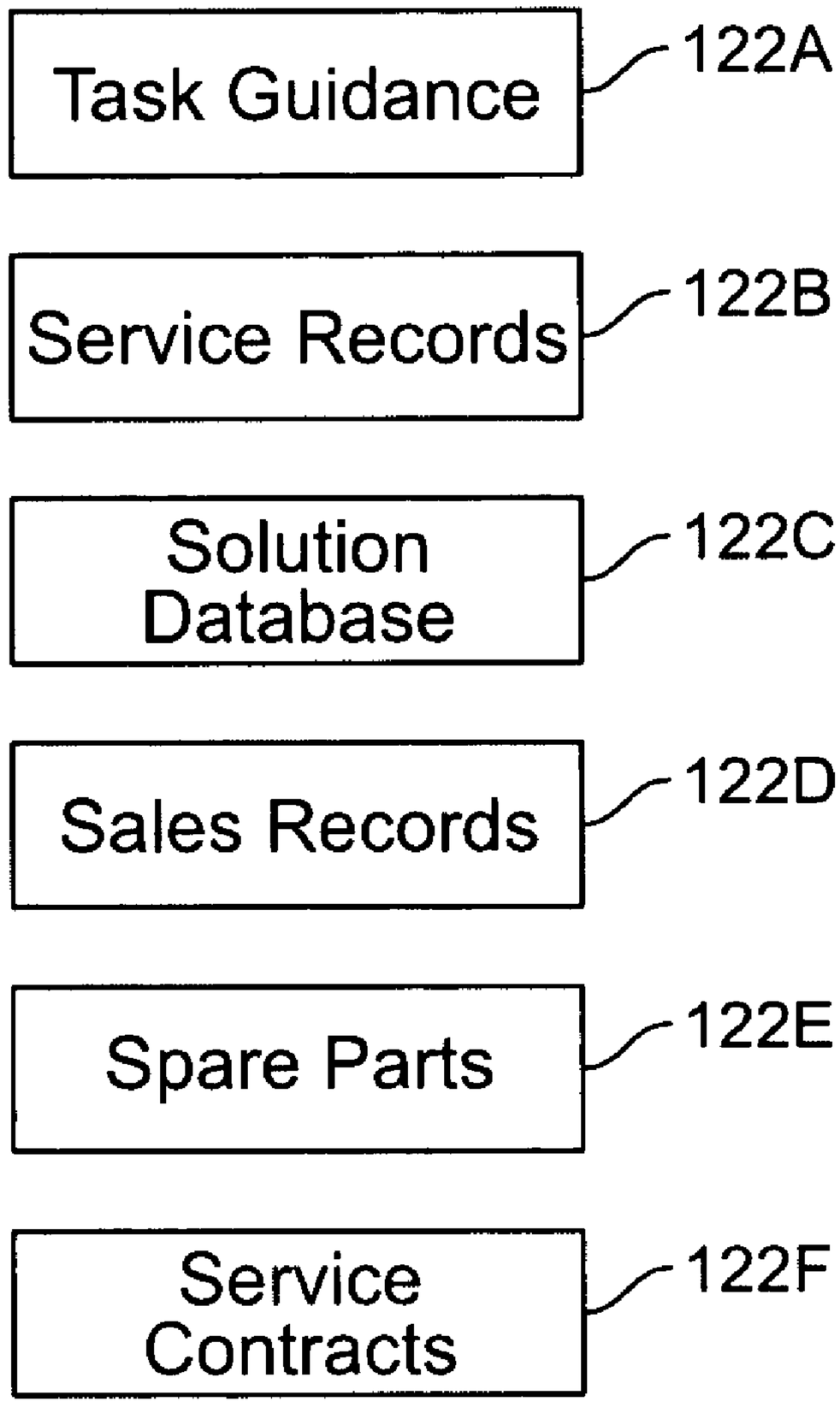
Task Guidance
122A
Service Records
122B
Solution Database
122C
Sales Records
122D
Spare Parts
122E
Service Contracts
122F
Pricing Information
122G
Product Information
122H
Sale Contracts
122I

FIG. 2

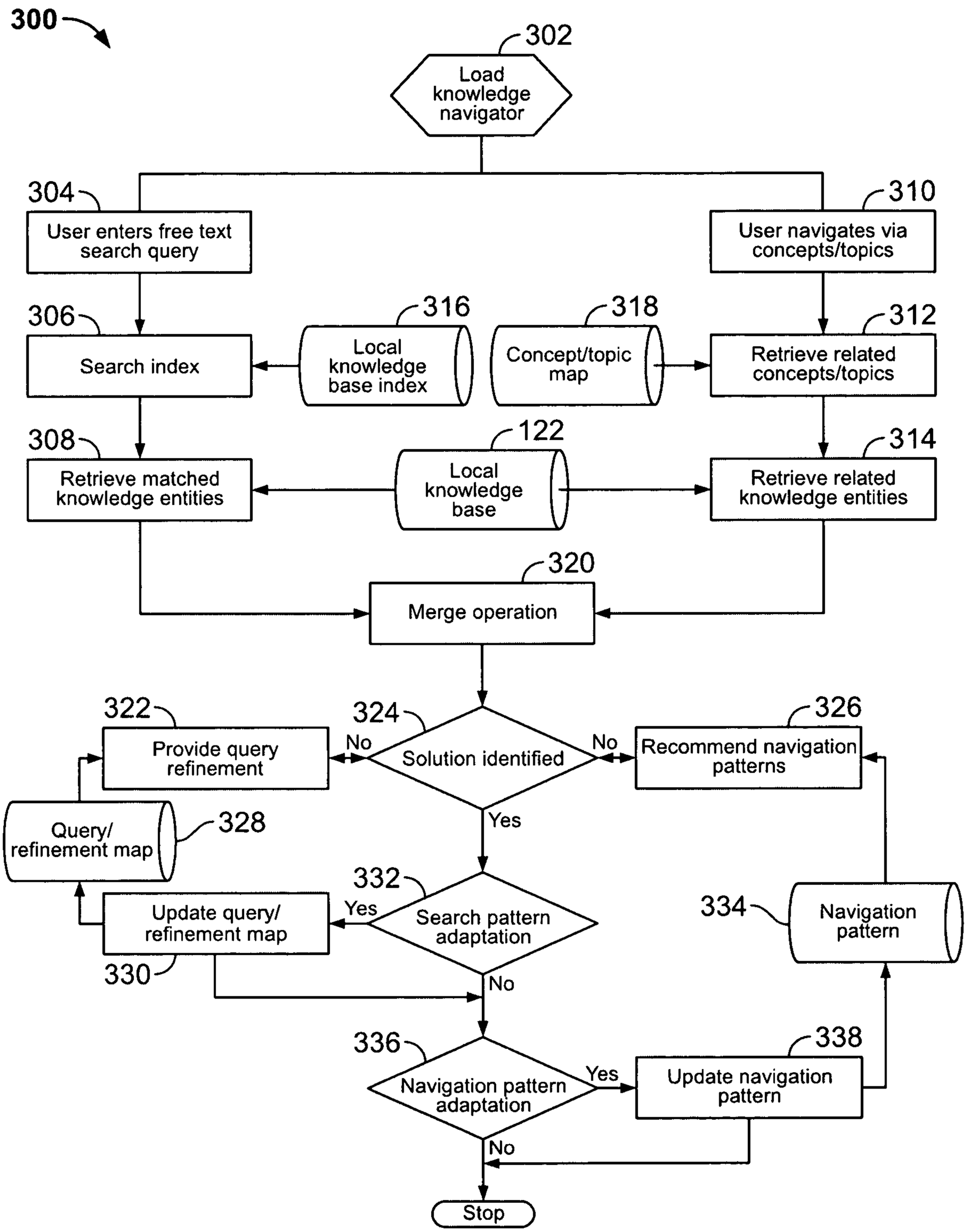
300
302
Load knowledge navigator
304
User enters free text search query
310
User navigates via concepts/topics
306
Search index
316
Local knowledge base index
318
Concept/topic map
312
Retrieve related concepts/topics
308
Retrieve matched knowledge entities
122
Local knowledge base
314
Retrieve related knowledge entities
320
Merge operation
322
Provide query refinement
324
Solution identified
No
No
326
Recommend navigation patterns
Yes
Query/ refinement map
328
332
Search pattern adaptation
Yes
Update query/ refinement map
330
334
Navigation pattern
No
336
Navigation pattern adaptation
Yes
338
Update navigation pattern
No
Stop

FIG. 3

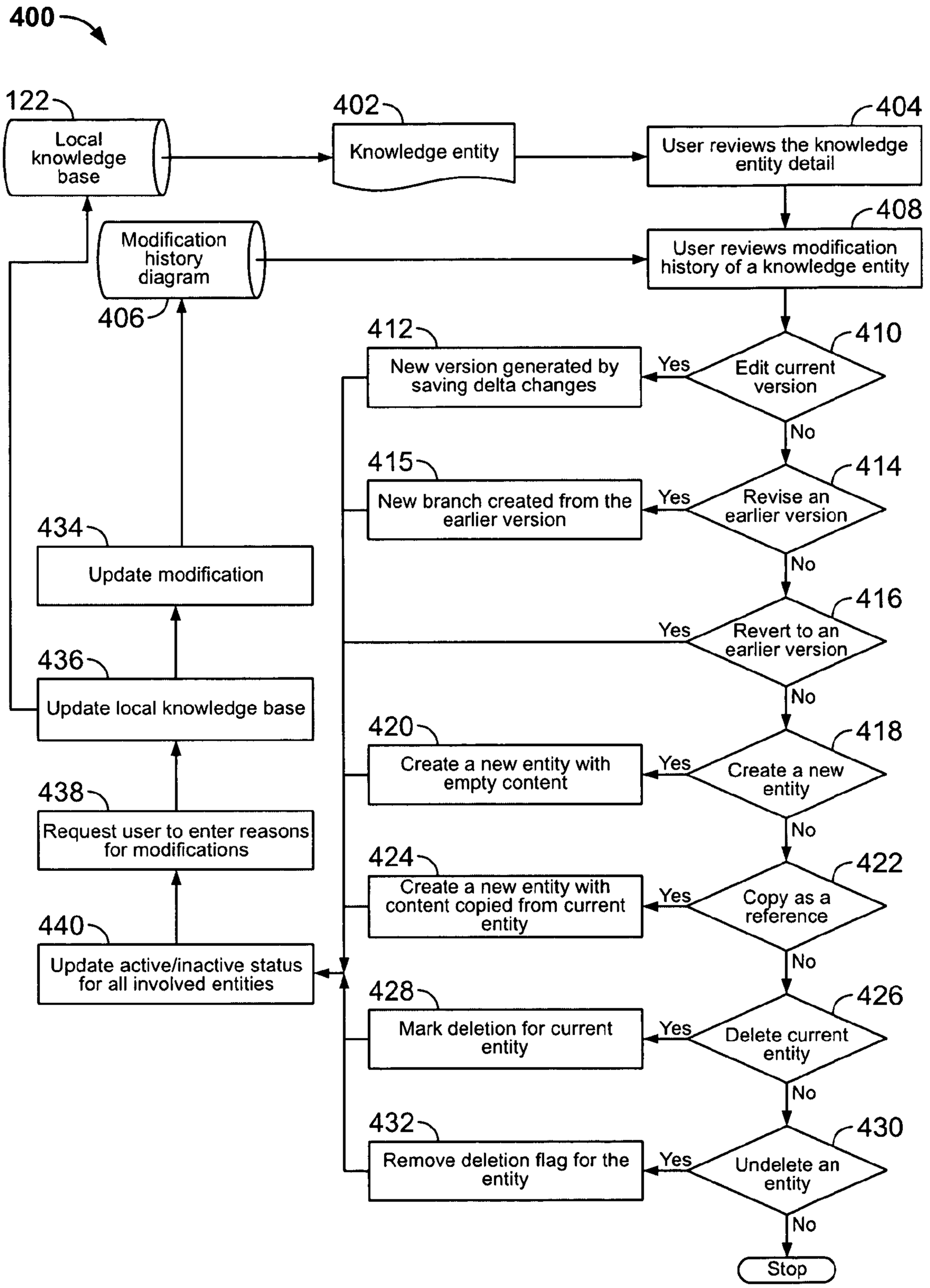
400
122
Local knowledge base
402
Knowledge entity
404
User reviews the knowledge entity detail
408
User reviews modification history of a knowledge entity
Modification history diagram
406
410
Edit current version
Yes
412
New version generated by saving delta changes
No
414
Revise an earlier version
Yes
415
New branch created from the earlier version
No
416
Revert to an earlier version
Yes
No
418
Create a new entity
Yes
420
Create a new entity with empty content
No
422
Copy as a reference
Yes
424
Create a new entity with content copied from current entity
No
426
Delete current entity
Yes
428
Mark deletion for current entity
No
430
Undelete an entity
Yes
432
Remove deletion flag for the entity
No
Stop
434
Update modification
436
Update local knowledge base
438
Request user to enter reasons for modifications
440
Update active/inactive status for all involved entities

FIG. 4

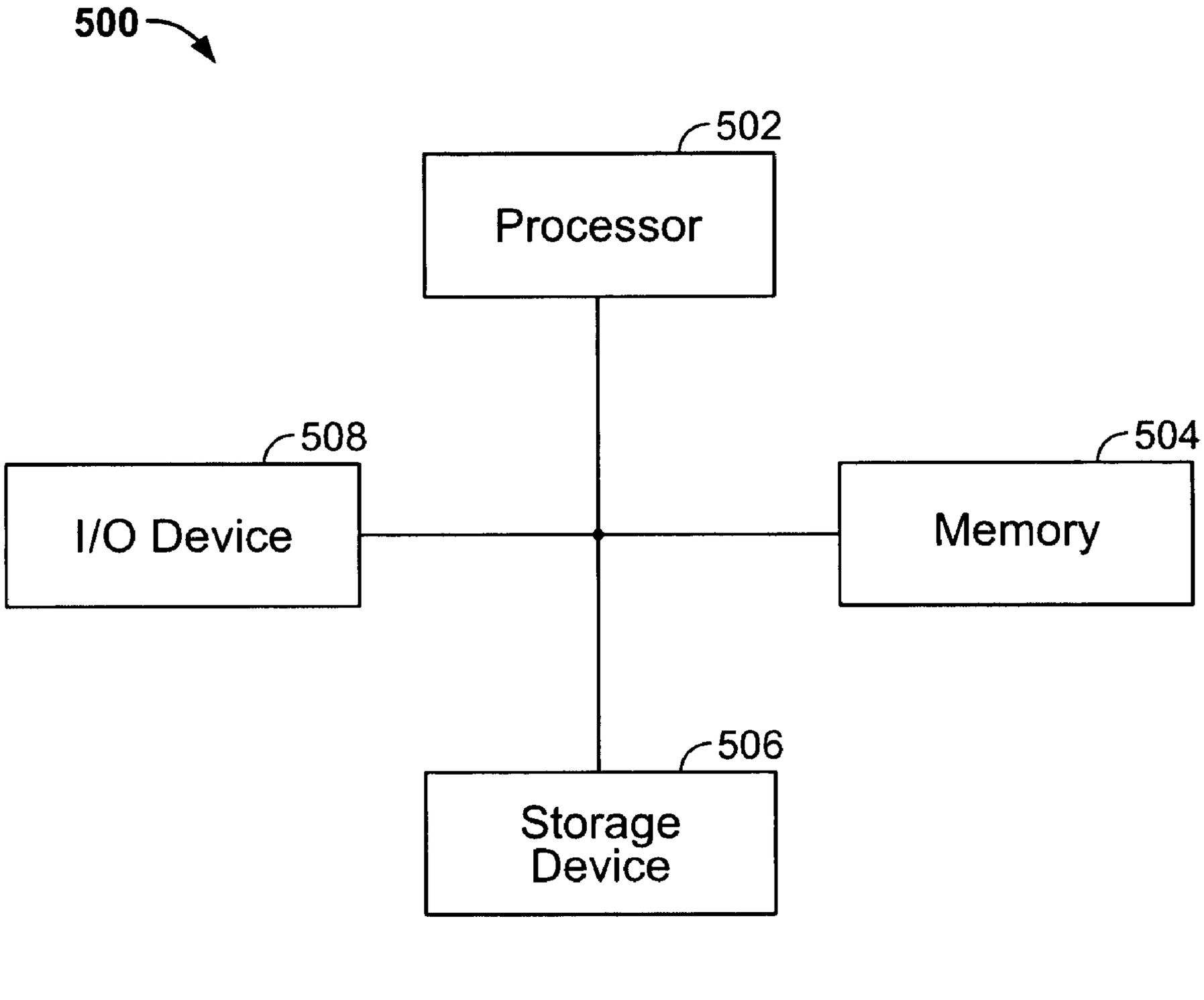
500
502
Processor
508
I/O Device
504
Memory
506
Storage Device

FIG. 5

MODIFIABLE KNOWLEDGE BASE IN A MOBILE DEVICE

TECHNICAL FIELD

This application relates to modifiable knowledge bases for use in computing systems.

BACKGROUND

In today's technology age, information and information sources are plentiful. On the World Wide Web, for example, individuals are capable of obtaining information from all over the world. Database and web servers may provide users with information about fixing a car, buying products or services, and the like.

Host servers are typically capable of storing a wide variety of information. In many instances, these servers maintain knowledge repositories to store various forms of knowledge. These knowledge repositories include one or more knowledge bases that each contain a specific type of knowledge. For example, the knowledge repository may include one knowledge base for storing automotive product information and another knowledge base for storing customer shipping information. The host servers frequently need to update and maintain the knowledge contained within these knowledge bases over time.

In addition, the host servers often interact with other external systems running business applications. These external systems are often coupled to the host servers using network connections, such as Internet, Ethernet, or wireless connections. For example, a service technician may use an external system, such as a personal data assistant (PDA) system, that is coupled to a host server using a wireless network connection. In another example, a call-center agent may use a call-center application running on an external system that is coupled to the host server using an Internet connection.

External systems that interact with host servers often include local knowledge bases. When these external systems operate and interact with the host servers, they frequently need to update the information contained within these local knowledge bases.

SUMMARY

Various implementations are provided herein. One implementation provides a method for modifying a knowledge base on a client device. The method includes receiving input from a user of the client device specifying a first proposed modification to the knowledge base, modifying the knowledge base as specified by the first proposed modification, and subsequently receiving electronic information from a host server specifying a second proposed modification to the knowledge base. The method further includes comparing the second proposed modification to the first proposed modification previously made to the knowledge base and, upon comparison, determining whether to modify the knowledge base as specified by the second proposed modification.

Various implementations may provide certain advantages. For example, one implementation provides an improvement to the contents of a local knowledge base on a client device, such as a mobile device, based upon usage metrics. The client device is capable of improving the usage of knowledge entities locally, after they have been acquired from a host server. The client device records the usage of the entities and adapts to a user's navigation behavior for locating different knowledge entities via a navigation tool. Furthermore, the user is able to manage the corresponding changes to the local knowledge base on the client device.

The details of one or more implementations are set forth in the accompanying drawings and the description below. Other features, objects, and advantages will be apparent from the description and drawings, and from the claims.

DESCRIPTION OF DRAWINGS

FIG. **1** is a block diagram of a system that includes a modifiable knowledge base in a mobile device, according to one implementation.

FIG. **2** is a diagram of various examples of modifiable knowledge bases that may be used within the mobile device shown in FIG. **1**.

FIG. **3** is a flow diagram of a method for processing information contained in the knowledge base shown in FIG. **1**, according to one implementation.

FIG. **4** is a flow diagram of a method for modifying the knowledge base shown in FIG. **1**, according to one implementation.

FIG. **5** is a block diagram of a computing device that may be included within the mobile device shown in FIG. **1**, according to one implementation.

DETAILED DESCRIPTION

FIG. **1** is a block diagram of a system **100** that includes a modifiable knowledge base **122** in a mobile device **104**, according to one implementation. The system **100** includes a host server **106** that is coupled to the mobile device **104**, which is a client device. A user **102**, such as a field technician, uses the mobile device **104**. Typically, the host server **106** provides initialization information to the mobile device **104** that is used during creation and configuration of the knowledge base **122**. This initialization information may specify the type of knowledge that is to be stored within the knowledge base **122**, and may also include actual knowledge that is stored within the knowledge base **122**. During operation, the mobile device **104** receives input from the user **102** specifying a first proposed modification to the local knowledge base **122** that is contained within the mobile device **104**. For example, if the user **102** is a field technician, the user **102** may want to update service order or product information within the knowledge base **122** after interacting with a customer. Upon receipt of the user input, the mobile device **104** modifies the knowledge base **122** as specified by the first proposed modification received from the user **102**. Subsequently, the mobile device **104** receives electronic information from the host server **106** specifying a second proposed modification to the knowledge base **122**. This electronic information may include a command to modify the knowledge base **122** is a specified manner, or may also include actual knowledge that is to be stored within the knowledge base **122**.

Upon receipt of this electronic information from the host server **106**, the mobile device **104** determines whether to modify the knowledge base **122** as specified by the second proposed modification. This determination is based upon a comparison of the second proposed modification to the first proposed modification previously made to the knowledge base **122**. For example, if the previous modification made upon prior receipt of the input from the user **102** has a high priority, or if the user **102** is an expert user, the mobile device **104** may decide not to modify the knowledge base **122** as specified by the second proposed modification if it were to conflict with the previous modification. If the user **102** is a field technician, for example, the user **102** may modify the

knowledge base **122** that is customized specifically for the customers that the user **102** regularly interacts with. These customers may have specific preferences that are captured by the user **102** and stored within the knowledge base **122**. If electronic information received from the host server **106** proposes to change these preferences or similar knowledge captured within the knowledge base **122**, the mobile device **104** may determine not to enter these proposed changes provided by the host server **106**. If the user **102** is an expert or highly trained user, the mobile device **104** may also choose not to modify the knowledge base **122** as proposed by the host server **106** in any way that would directly conflict with modifications proposed by the user **102**. In this situation, modifications specified by the user **102** override any conflicting modifications proposed by the host server **106**.

In one implementation, a modification manager **114** manages modifications that are made to the knowledge base **122**. The modification manager **114** uses a set of rules to determine if and when modifications are incorporated into the knowledge base **122**. In one implementation, the modification manager **114** may determine that the knowledge base **122** is to be modified as specified by the electronic information received from the host server **106**. If, however, the modification manager **114** also includes a rule stating that previous modifications to the knowledge base **122** specified by the user **102** are to override conflicting modifications specified by the host server **106**, the modification manager **114** will identify the modifications specified by the host server **106** in a new version of the knowledge base **122**. During subsequent operations, however, the modification manager **114** will revert to a prior version of the knowledge base **122** that is based upon the previous modification made to the knowledge base **122** based upon input received from the user **102**. In this fashion, the prior version of the knowledge base **122** can be used by the mobile device **104** but the new version corresponding the modifications specified by the host server **106** is still saved. The modification manager **114** is able to, at any point, change over to this new version. For example, if a rule used by the modification manager **114** is changed to specify that all modifications initiated by the host server **106** are to take precedence, the modification manager **114** can then change over to the new, saved version of the knowledge base **122**.

In another scenario, the mobile device **104** may determine to modify the knowledge base **122** as specified by the electronic information received from the host server **106**. For example, the modification manager **114** may include a rule specifying that any modification specified by electronic information received from the host server **106** overrides any previous modification made to the knowledge base **122** based upon input received from the user **102**. In particular, the rule may specify that the knowledge base **122** is to be modified any time that the host server **106** requests such a modification. The host server **106** is often coupled to many additional mobile devices and may manage global changes to the knowledge bases contained in each of these mobile devices, including the mobile device **104**. Each of these knowledge bases are capable of being synchronized with a master knowledge base contained on the host server.

Alternatively, the mobile device **104** may determine to modify the knowledge base **122** as specified by the electronic information received from the host server **106** when, for example, prior and conflicting modifications to the knowledge base **122** were proposed by a very inexperienced user **102**. In this situation, the mobile device may determine that any modifications specified by the host server **106** are to override any modifications proposed by the inexperienced user **102**. If such modifications proposed by the user **102** have already been incorporated into the knowledge base **122**, they are overwritten by the modifications specified by the host server **106**.

Modifications to the knowledge base **122** may include additions of new knowledge entities, deletions of existing knowledge entities, or changes to existing knowledge entities contained within the knowledge base **122**. The modification manager **114** manages all such additions, deletions, and changes to the associated knowledge entities upon receipt of input from the user **102**.

As shown in FIG. **1**, the mobile device includes a graphical user interface (GUI) application **108** that provides a means of interaction with the user **102**. The GUI application **108** displays a GUI to the user **102** on a display device, according to one implementation. The GUI displays various windows or other screen elements to the user **102** and is also capable of accepting input from the user **102**. For example, the user **102** may use the GUI provided by the GUI application **108** to specify modifications that are to be made within the knowledge base **122**. The user **102** may enter free-form text, or more alternatively make menu selections to specify these modifications.

The GUI application **108** is coupled to a personalization engine **110**. The personalization engine **110** customizes the applications and operations of the mobile device according to the preferences of or input received from the user **102**. For example, the user **102** may have a preference to view information within the GUI or to interact with the GUI application **108** in a particular way. This preference can be maintained and managed by the personalization engine **110**. The personalization engine **110** may also manage customizations within the knowledge base **122**. For example, if the user **102** has specified a particular modification within the knowledge base **122**, the personalization engine **110** is able to keep track of this modification for later use. The personalization engine **110** is coupled to the modification manager **114**. In one implementation, the user **102** is capable of defining various rules that are used by the modification manager **114**.

The mobile device also contains a knowledge navigator **112**, a navigation pattern recorder **116**, and a navigation index **120**. The GUI application **108** uses the navigation index **180** and the knowledge navigator **112** to display a navigable representation of the knowledge contained in the knowledge base **122** to the user **102**. For example, the GUI application **108** may display to the user **102** a specialized navigation tree within a GUI to display an organized structure of the knowledge in the knowledge base **122**. The GUI may contain various expandable and collapsible menus, data-entry fields, knowledge description fields, and the like. By using the GUI, the user **102** is able to efficiently navigate through the contents of the knowledge base **122**. In addition, the user **102** is able to provide input into the GUI to select contents from or to search the knowledge base **122**. For example, the user **102** may decide to modify certain contents of the knowledge base **122** through use of the GUI.

The navigation pattern recorder **116** records the navigational pattern used by the user **102** within the GUI. For example, the recorder **116** may record the specific navigational pattern used by the user **102** when navigating through multiple knowledge entities contained within the knowledge base **122** that are categorized by similarity or past usage by the user **102**. The user **102** may navigate through one or more selection sequences while navigating, and the navigation pattern recorder **116** records these selection sequences. The feedback recorder **118** records the input received by the user **102** to select specific knowledge entities within the GUI or to make modifications to one or more of these knowledge enti-

ties. For example, the feedback recorder **118** may record that the user **102** selected knowledge entities A, B, and C in sequence within the navigation structure displayed in the GUI. The knowledge entities A, B, and C are contained within the knowledge base **122**. The feedback recorder **118** may further record actions by the user **102** within the GUI to select one or more of these knowledge entities. The feedback recorder **118** also records modifications that are made by the user **102** to one or more knowledge entities within the knowledge base **122**. These modifications are then further processed by the modification manager **114**. The feedback recorder **118** may also record the reaction of the user **102**, such as accepting or rejecting a new change of a specific knowledge entity, after receiving a modification from the host server **106**.

The data synchronization application **124** synchronizes the information contained in the mobile device **104** and the host server **106**. Typically, the host server **106** includes a master knowledge base. When the host server **106** modifies this master knowledge base, it sends electronic information to the data synchronization application **124** to modify the knowledge base **122** in a similar fashion. As described above, the modification manager **114** determines whether to actually modify the knowledge base **122** upon receipt of this information from the host server **106**. In some implementations, the data synchronization application **124** also sends electronic information to the host server **106** when the modification manger **114** modifies the knowledge base **122** based on input received from the user **102**. In these implementations, the mobile device **104** requests that the host server **106** update its master knowledge base to become synchronized with the modifications made in the knowledge base **122**.

As shown in FIG. **1**, the host server **106** is coupled to the mobile device **104**. In one implementation, the host server **106** is coupled to the mobile device **104** using a wireless network connection.

FIG. **2** is a diagram of various examples of modifiable knowledge bases **122**A, **122**B, **122**C, **122**D, **122**E, **122**F, **122**G, **122**H, and **122**I that may be used within the mobile device **104** shown in FIG. **1**. In various different implementations, the knowledge base **122** comprises one of the knowledge bases **122**A, **122**B, **122**C, **122**D, **122**E, **122**F, **122**G, **122**H, and **122**H shown in FIG. **2**. The task guidance knowledge base **122**A includes information that may help users, such as the user **102**, execute certain tasks. For example, if the user **102** is a field technician, the task guidance knowledge base **122**A may include a script that the user **102** may read and follow to interact with specific types of customers. The service record knowledge base **122**B includes past or current service information for service visits. The solution database **122**C includes information that may be used by the user **102** to solve problems when interacting with other individuals, such as customers. The sales record knowledge base **122**D includes information relating to prior sales made to customers. The spare parts knowledge base **122**E includes information about specific parts that the user **102**, such as a field technician, may use during an ordinary course of business. The service contract knowledge base **122**F includes service contract information for various customers. The pricing information knowledge base **122**G includes price information, and the product information knowledge base **122**H includes detailed information about products that customers may use or purchase. The sales contract knowledge base **122**I includes sales contract information for various customers. Both the host server **106** and the user **102** may provide information to the mobile device **104** to specify modifications that are to be made to one of these knowledge bases in various different scenarios. For example, the user **102** may interact with a customer and determine that certain information needs to be updated within the knowledge base **122**. The host server **106** may maintain a master knowledge base. If this master knowledge base is modified, the host server **106** may send information to the data synchronization application **124** within the mobile device **104** to modify the knowledge base **122** in a similar fashion.

The user **102** may have the authorization to access the local knowledge base **122**, but whether the user **102** can modify the content of a specific knowledge entity depends on whether the user **102** has the authorization to create, modify, and delete the knowledge entity based upon the business roles associated with the user **102**. For example, a field engineer may be able to modify a service record but not a sales contract, and a pricing manager may be able to change the pricing information for a specific product but not a service record. The modification manager **114**, however, provides the functionality for the user **102** to add annotations to knowledge entities in the local knowledge base **122** regardless the access authorization for the user **102**.

FIG. **3** is a flow diagram of a method **300** for processing information contained in the knowledge-base **122** shown in FIG. **1**, according to one implementation. In this implementation, the method **300** includes various actions and checkpoints. In an action **302**, the knowledge navigator **112** loads knowledge navigation information. The knowledge navigator **112** may use the navigation index **120** during the action **302**. The user **102** may enter free-form text into a search query in an action **304**. The user **102** enters this text within a text-entry field in a GUI that is provided by the GUI application **108**. In an action **306**, the mobile device **104** searches an index **316** that has been compiled from the knowledge base **122**. In the action **306**, the index **316** is searched for knowledge entities that match the search query. In an action **308**, the mobile device **104** retrieves matching knowledge entities from the knowledge base **122**. Entries that are associated with these matching knowledge entities are also displayed to the user **102** within the GUI.

The user **102** may alternatively use the GUI to navigate through various selectable concepts and/or topics in an action **310**. The knowledge navigator **112** may interact with the GUI application **108** to provide a display of these selectable concepts or topics to the user **102**. These concepts and topics relate to knowledge entities that are contained within the knowledge base **122**. In an action **312**, related concepts and/or topics are retrieved from a map **318** using the information provided by the user **102** in the action **310**. The map **318** contains a mapping of concepts and/or topics that logically related. The map **318** may be configured by an administrator at startup, but may also be dynamically updated at runtime based upon changes requested by the administrator or by the user **102**. In an action **314**, the knowledge entities that are related to the selected concepts/topics and related concepts/topics are retrieved from the knowledge base **122**. Each concept and/or topic is specifically related to one or more knowledge entities contained within the knowledge base **122**. The knowledge navigator **112** and the navigation index **120** maintain the relationships between these concepts and/or topics and the knowledge entities.

In an action **320**, the retrieved knowledge entities from the actions **308** and **314** are merged into a group of knowledge entities. At a checkpoint **324**, the feedback recorder **118** determines if a solution has been identified by the user **102** based upon user input. Typically, the user **102** provides input within the GUI to indicate whether a solution has been identified within the group of knowledge entities. For example, the user

102 may select one of the knowledge entities as a solution, or may alternatively specify within the GUI that none of the knowledge entities within the group provide a solution to a problem encountered by the user **102**.

If no solution is identified at the checkpoint **324**, actions **322** and/or **326** may be performed by the mobile device **104**. In an action **322**, the mobile device **104** provides a query refinement to the search query initially provided by the user **102** in the action **304**. The refinement is used to help provide the user **102** with a different, or more broad, set of search results for knowledge entities contained within the knowledge base **122** that may provide a solution to the problem encountered by the user **102**. When performing the action **322**, the mobile device **104** accesses a query/refinement map **328**. The user **102** then can have various interactions between the action **322** and the checkpoint **324** until a knowledge entity is identified. In an action **326**, the mobile device **104** recommends navigational patterns that may be used by the user **102** to locate additional knowledge entities that may provide a solution to the problem. When performing the action **326**, the mobile device **104** accesses a navigation pattern map **334** previously recorded by the navigation pattern recorder **116**. The user **102** may re-start a search or navigate activities by going back to action the action **304** or **310**.

If a solution has been identified at the checkpoint **324**, the mobile device **104** then determines whether there is to be a search pattern adaptation at a checkpoint **332**. If there is a search pattern adaptation for future iterations, the mobile device **104** updates the query/refinement map **328** in an action **330**. In one implementation, the feedback recorder **118** updates the query/refinement map **328**. The action **330** is performed to improve the query/refinement map **328** for use during subsequent search cycles. The improvement is based upon the search query that was used to locate a solution associated with one or more knowledge entities during the current cycle (in the action **324**).

The query/refinement map **328** can be updated in various ways. For example, the association of key textual terms in the initial query and key textual terms from the refined query can be strengthened, such that if a specific key term from the initial query occurs in the future, associated key terms for a recommended refinement can be identified. In another example, the query/refinement map **328** may be represented as a searchable index with an initial query as the searchable content and the final query as the matched result. In this example, the action **322** will submit an initial query as the search query to the query/refinement map **328**.

The mobile device **104** also determines whether there is to be a navigation pattern adaptation at a checkpoint **336**. If there is a navigation pattern adaptation for future iterations, the mobile device **104** updates the navigation pattern data store **334** in an action **338**. In one implementation, the navigation pattern recorder **118** updates the navigation pattern data store **334**. The action **338** is performed to improve the contents of the navigation pattern data store **334** for use during subsequent search cycles. The improvement is based upon the navigation pattern that was used to locate a solution associated with one or more knowledge entities during the current cycle (in the action **324**).

For example, a past sequence may have a navigation pattern for a topic tree for several branches until a final solution is identified. When a new navigation matches a partial path of a historical navigation, the remaining navigation path of the historical navigation may be used for recommendation. In another example, a past sequence may have a navigation pattern for a set of concepts in sequence. When a new concept navigation matches a partial sequence of a historical navigation, the remaining set of concepts of the historical navigation may be used for recommendation.

FIG. **4** is a flow diagram of a method **400** for modifying the knowledge base **122** shown in FIG. **1**, according to one implementation. In FIG. **4**, the local knowledge base **122** contains a knowledge entity **402**. The knowledge entity **402** includes a specific component of knowledge, such as information about a specific product or a specific customer. In an action **404**, the user **102** reviews the details of the knowledge entity **402** using the GUI application **108**. For example, the user **102** may review specific product details for a knowledge entity associated with a product or specific customer details for a knowledge entity associated with a customer. In an action **408**, the user **102** reviews the modification history for the knowledge entity **402**. A modification history diagram **406** contains the modification history for the knowledge entity **402**. For example, the modification history diagram **406** may indicate that the user **102** previously added and changed the knowledge entity **402**.

At a checkpoint **410**, the feedback recorder **118** determines if the user **102** has provided input to edit the current version of the knowledge entity **402**. The feedback recorder **118** makes this determination by processing user input received by the GUI application **108**. For example, if the knowledge entity **402** includes customer information, the user **102** may want to update the customer information after receiving new information from the customer. If the user **102** wants to edit the current version of the knowledge entity **402**, the modification manager **114** marks the current version as a prior version of the knowledge entity **402** and then generates a new version of the knowledge entity **402** in an action **412**. The new version incorporates delta changes made to the knowledge entity **402** by the user **102** that have been processed by the feedback recorder **118**.

At a checkpoint **414**, the feedback recorder **118** determines if the user **102** has provided input to revise an earlier version of the knowledge entity **402**. For example, the user **102** may want to revise an earlier version of the knowledge entity **402** that has been previously used or was previously modified by the user **102**. In this case, the modification manager **114** creates a new branch from the earlier version in an action **415**.

At a checkpoint **416**, the feedback recorder **118** determines whether the user **102** has provided input to revert to the earlier version of the knowledge entity **402**. The user **102** may want to revert to the earlier version in certain scenarios. For example, the current version of the knowledge entity **420** may include changes made by the host server **106** and communicated to the mobile device **104**. If the user **102** does not wish to use these changes, for example, or if the changes conflict with changes that the user **102** previously made to the knowledge entity **402**, the user **102** may wish to revert to the earlier version of the knowledge entity **402**. In an alternate implementation, the modification manager **114** may reject a modification request for the knowledge entity **402** received from the host server **106** if, for example, the request conflicts with a prior modification made to the knowledge entity **402** by the user **102**. In this case, the modification manager **114** does not register a modification within the knowledge base **122**, and the user **102** is able to use the current version of the knowledge entity **402**.

At a checkpoint **418**, the feedback recorder **118** determines whether the user **102** has provided input to create a new knowledge entity. For example, the user **102** may want to create a new knowledge entity for a new sales contract, new product information, new customer information, or the like. If the user **102** has provided input to create a new knowledge entity, the modification manager **114** creates a new entity in

the knowledge base **122** with empty content in an action **420**. The user **102** can later enter content by modifying the new knowledge entity.

At a checkpoint **422**, the feedback recorder **118** determines whether the user **102** has provided input to copy the knowledge entity **402** as a reference. If the user **102** has provided such input, the modification manager **114** creates a new knowledge entity with content that is copied from the current knowledge entity **402** in an action **424**. In doing so, the user **102** is then able to modify the new knowledge entity without altering the modification history of the knowledge entity **402**.

At a checkpoint **426**, the feedback recorder **118** determines whether the user **102** has provided input to delete the current knowledge entity **402**. If the user has provided such input, the modification manager **114** uses a deletion flag to mark the knowledge entity **402** for deletion in an action **428**.

At a checkpoint **430**, the feedback recorder **118** determines whether the user **102** has provided input to undelete the knowledge entity **402**. If the user has provided such input, the modification manager **114** removes a deletion flag for the knowledge entity **402** in an action **432**.

In an action **440**, the modification manager **114** updates the active/inactive status for all involve knowledge entities, such as the knowledge entity **402** or any new knowledge entities that have been created. Any knowledge entities that have a deletion flag are updated to an inactive status, and knowledge entities that have had deletion flags removed are updated to an active status. In an action **438**, the feedback recorder **118** may request that the user **102** enter reasons for any modifications that have been made. The modification manager **114** then updates the knowledge base **122** in an action **436** and also updates the modification history diagram **406** in an action **434**.

FIG. **5** is a block diagram of a computing device **500** that may be included within the mobile device **104** shown in FIG. **1**, according to one implementation. The computing device **500** includes a processor **502**, a memory **504**, a storage device **506**, and an input/output device **508**. Each of the components **502**, **504**, **506**, and **508** are interconnected using a system bus. The processor **502** is capable of processing instructions for execution within the computing device **500**. In one implementation, the processor **502** is a single-threaded processor. In another implementation, the processor **502** is a multi-threaded processor. The processor **502** is capable of processing instructions stored in the memory **504** or on the storage device **506** to display graphical information for a GUI on the input/output device **508**.

The memory **504** stores information within the computing device **500**. In one implementation, the memory **504** is a computer-readable medium. In one implementation, the memory **504** is a volatile memory unit. In another implementation, the memory **504** is a non-volatile memory unit.

The storage device **506** is capable of providing mass storage for the computing device **500**. In one implementation, the storage device **506** is a computer-readable medium. In various different implementations, the storage device **506** may be a floppy disk device, a hard disk device, an optical disk device, or a tape device.

In one implementation, a computer program product is tangibly embodied in an information carrier. The computer program product contains instructions that, when executed, perform one or more methods, such as those described above. The information carrier is a computer- or machine-readable medium, such as the memory **504**, the storage device **506**, or a propagated signal.

The input/output device **508** provides input/output operations for the computing device **500**. In one implementation, the input/output device **508** includes a keyboard and/or pointing device. In one implementation, the input/output device **508** includes a display unit for displaying various GUI's, such as a GUI for the knowledge navigator **112**.

A number of implementations have been described. Nevertheless, it will be understood that various modifications may be made without departing from the spirit and scope of these implementations. Accordingly, other implementations are within the scope of the following claims.

What is claimed is:

1. A processor-implemented method for updating user input information stored in a local knowledge base on a client device to synchronize with information in a remote knowledge base stored on a host device, the method comprising:

receiving input from a user of a client device specifying a user-proposed modification to a knowledge base that comprises a memory space for storing information in electronic form for the client device;

modifying the knowledge base as specified by the user-proposed modification by storing the received user input in the memory space;

subsequently receiving electronic information from a host server specifying a host-proposed modification to the knowledge base;

comparing the host-proposed modification to the user-proposed modification previously made to the knowledge base to determine if the user- and host-proposed modifications conflict;

upon comparison, determining whether to override the user-proposed modification with the host-proposed modification, the determination being made using a rules engine and taking into account an experience level of the user; and

modifying the knowledge base by storing in the memory space the electronic information received from the host server as specified by the host-proposed modification if the determination is made to override the user-proposed modification.

2. The method of claim **1**, further comprising creating the knowledge base on the client device.

3. The method of claim **1**, wherein the host-proposed modification conflicts with the user-proposed modification, and wherein determining whether to override the user-proposed modification includes determining not to modify the knowledge base as specified by the host-proposed modification if the user-proposed modification previously made to the knowledge base takes priority over the host-proposed modification.

4. The method of claim **1**, wherein the host-proposed modification overrides the user-proposed modification previously made to the knowledge base.

5. The method of claim **4**, wherein the host-proposed modification conflicts with the user-proposed modification.

6. The method of claim **1**, wherein if the user-proposed modification previously made to the knowledge base overrides the host-proposed modification, the method further comprises:

reverting to a prior version of the knowledge base that is based upon the user-proposed modification previously made to the knowledge base.

7. The method of claim **6**, wherein the host-proposed modification conflicts with the user-proposed modification.

8. The method of claim **1**, wherein modifying the knowledge base includes adding a new knowledge entity to the knowledge base.

9. The method of claim 1, wherein modifying the knowledge base includes deleting an existing knowledge entity from the knowledge base.

10. The method of claim 1, wherein modifying the knowledge base includes changing an existing knowledge entity in the knowledge base.

11. The method of claim 1, wherein receiving input from a user of the client device includes receiving input using a graphical user interface (GUI).

12. The method of claim 1, wherein the client device is a mobile device.

13. A computer program product tangibly embodied in a data storage device, the computer program product including instructions that, when executed, perform a method for synchronizing user-input information in a local knowledge base stored on a client device with information in a remote knowledge base stored on a host device, the method comprising:

receiving input from a user of a client device, the received input specifying a user-proposed modification to a knowledge base that comprises a memory space for storing information in electronic form for the client device;

modifying the knowledge base as specified by the user-proposed modification by storing the received user input in the memory space;

subsequently receiving electronic information from a host server specifying a host-proposed modification to the knowledge base;

comparing the host-proposed modification to the user-proposed modification previously made to the knowledge base to determine if the user- and host-proposed modifications conflict;

upon comparison, determining whether to override the user-proposed modification with the host-proposed modification, the determination being made using a rules engine and taking into account an experience level of the user; and

modifying the knowledge base as by storing in the memory space the electronic information received from the host server specified by the host-proposed modification upon determining to override the user-proposed modification.

14. A system to process conflicting input commands from a user and a host device so as to synchronize information in a local knowledge base stored on a client device with information in a knowledge base stored on a host device, the system comprising:

memory;

a processor;

computer program code executable on the processor, the computer program code to perform the following functionalities:

receive input from a user of a client device, the received input specifying a user-proposed modification to a knowledge base that comprises a memory space for storing information in electronic form for the client device;

modify the knowledge base as specified by the user-proposed modification by storing the received user input in the memory space;

subsequently receive electronic information from a host server, the received electronic information specifying a host-proposed modification to the knowledge base;

compare the host-proposed modification to the user-proposed modification previously made to the knowledge base to determine if the user- and host-proposed modifications conflict;

upon comparison, determine whether to override the user-proposed modification with the host-proposed modification, the determination being made using a rules engine and taking into account an experience level of the user; and

modify the knowledge base by storing in the memory space the electronic information received from the host server as specified by the host-proposed modification if the determination is made to override the user-proposed modification.

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